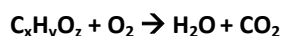


T05D08 – Energetics Design Lab #2

Name.....

When using various hydrocarbons as an energy source, the heat content of each compound can be determined and the accumulation of its products can also be measured if desired. The combustion of hydrocarbons follows the generic equation of:



$$\Delta H_c^\ominus = - \text{value (exothermic)}$$

Energetically we would consider the heat content of such a reaction to be the enthalpy of combustion (ΔH_c^\ominus). As noted above, all combustion reactions are exothermic. We can determine the value of ΔH_c^\ominus both experimentally and theoretically.

A common category of fuels are mono-hydroxy alcohols, each having the generic formula of $C_nH_{2n+1}OH$. A common example being methanol, CH_3OH , the most basic alcohol where $n=1$. The value of n can increase as necessary. For this lab, assume you have any value available chemicals listed below.

Your Task:

Develop a hypothesis and design an experiment that will allow you to answer the following question:

What property or characteristic of the compound determines the relative heat content of alcohols?

Grading Criteria: Design (D)

Topic: Energetics SL

Material Covered: Topics 01-05, 11 SL

Time allowed: One 90 minute period

- Following the 90 minute period, you will upload this your document to Mr. Brakke via “DropItToMe”
 - Visit the website: www.dropitto.me/martinb
 - Password: ilovechem
 - Upload file

Format: Typed is preferred, handwritten is acceptable

Rubric: The generic IA lab rubric is attached to this form.

The following is an accumulation of data which may or may not help you in your lab. The focus of this lab should be energetics so use your prior knowledge. You DO NOT have to use all of the materials listed, please follow the rubric closely.

Alcohol Name	Stick Model Structure	Formula	Density (g/mL)	Melting Point (°C)	Boiling Point (°C)	Molar Mass (g/mol)	ΔH_c^\ominus (kJ/mol)
Methanol		CH_3OH	0.792	-98	65	32.04	726
Ethanol		C_2H_5OH	0.789	-114	78	46.07	1367
1-Propanol		C_3H_7OH	0.803	-126	97	60.1	2021
1-Butanol		C_4H_9OH	0.810	-90	118	74.12	2676
1-Pentanol		$C_5H_{11}OH$	0.814	-78	137	88.15	3329
1-Hexanol		$C_6H_{13}OH$	0.814	-53	155	102.17	3984
1-Heptanol		$C_7H_{15}OH$	0.819	-34	179	116.2	4638
1-Octanol		$C_8H_{17}OH$	0.824	-16	195	130.23	5294
1-Nonanol		$C_9H_{19}OH$	0.830	-6	214	144.25	5943
1-Decanol		$C_{10}H_{21}OH$	0.830	6.4	233	158.28	6600

***The use of online resources and a search of labs previously completed and uploaded are not acceptable.